LETTERS TO THE EDITOR

EFFECTS OF L-SHELL ELECTRONS ON THE POLARIZATION OF ELASTIC SCATTERING OF GAMMA RAYS

In a previous communication[1] the results of the measurement of the linear polarization of the elastic scattering of 662 keV gamma rays from lead at 64° were reported and it was shown that the incomplete isolation of coherent scattering from the incoherent scattering lowers the experimental results in comparison with the theoretical predictions[2] and that either complete isolation of coherent scattering or correction for the contribution of incoherent to coherent scattering should give correct results in agreement with theory ; this was in contradiction with the suggestion of earlier workers[3] who ascribed the previously observed[3,4] lower values to the contribution of L-shell electrons. We have extended the measurements to other gamma ray energies and angles and investigated the influence of L-shell electrons in more detail. The method of measurements was the same as described previously.[1] The effect of the contribution of L-shell electrons was estimated as described below.

1. If according to the assumption of Bernstein and Mann[5] the spin flip and non-spin form factor contribution due to L-shell electrons are taken in the same ratio as the corresponding contributions for the K-shell electrons, the contribution of L-shell electrons does not have any effect on the percentage polarization and the final value is the same as calculated from K-shell data of Brown *et al.*

2. However, if according to the suggestion of Brown and Mayer,[2] that at large values of momentum transfer, the contributions of non-spin flip components may be neglected in comparison with the spin flip contribution, the values of percentage polarization of the elastic scattering for K-electrons will be affected by the contribution of L-shell electrons. The results are summarised in Table I.

The comparison of experimental values with the theoretical calculations confirms our previous results that incomplete isolation of coherent scattering from incoherent scattering tends to lower the observed values of percentage polarization and the effect of L-shell electrons, if any, is small and does not show itself above experimental errors.

TABLE I

Scattering angle	Gamma ray energy (Mev)	Percentage Polarization (Rayleigh + Thomson Scattering) Experimental	Theoretical: Without L-shell contribution	Theoretical: L-shell Bernstein and Mann	Theoretical: L-shell Brown and Mayers
64°	0·662	96±8*	91	91	96
		94±6†			
		88±10†			
	1·25	100±15	93	93	90
90°	0·662	78±8*	78·5	78·5	69
		90±14†			
	1·25	15·7±6·4	17·2	17·2	14
93·5°	0·280	95±6*	90	90	87
120°	0·280	42·5±5·5*	45	45	41
	0·662	28·4±6·5*	..		
		33·7†	25·3	25·3	21

* Data obtained with almost complete isolation of coherent contribution from incoherent contribution.

† Data obtained after correcting for the contribution of incoherent to coherent scattering under experimental channels.

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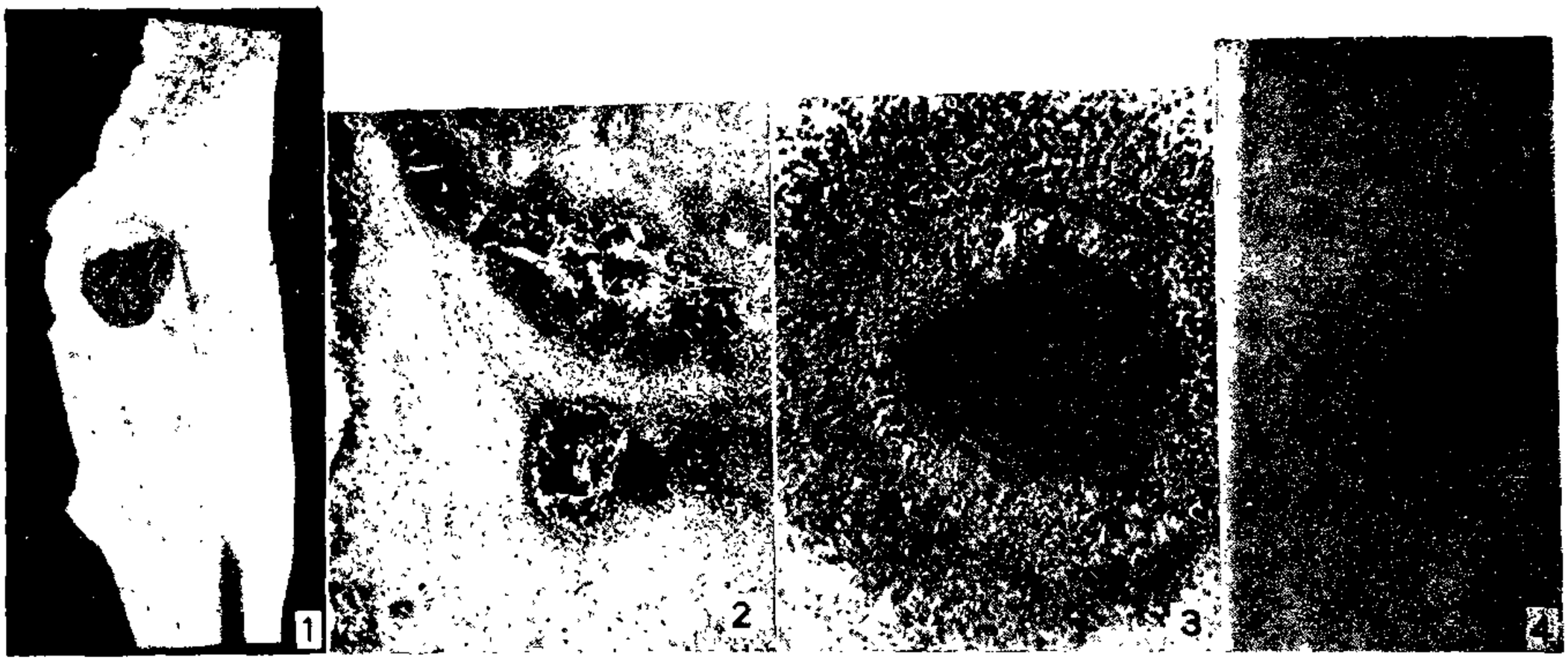
UNUSUAL FINDING OF METALLIC LEAD IN THE ELEPHANT TUSK

THE use of ivory in inlaying work of art for decorative purposes is well known. In industry, little is wasted of this valuable material.

For minimal wastage of this material, a new technique has been adopted by the author to cut uniformly 100–200 micron thickness after slightly decalcifying the whole tusk in formic acid. The material is clamped to a giant microtone and the sections are taken at a desired thickness. Recently a part of tusk measuring 4¼" in diameter and 6" in length was received from an industry for similar sections by the author. Longitudinal sections were taken to a depth of about 2½". At this level the cutting



FIGS. 1-4. Fig. 1. Photograph of the tusk longitudinally cut showing the embedded lead piece at the depth of 2½". *Fig. 2. Section of the tusk showing higher concentration of lead particles just around the* lead piece. Chromic acid stain, × 100. Fig. 3. Section of the tusk showing a single collecion of lead particles at the border of the lesion. Chromic acid stain, × 400. Fig. 4. X-ray of the tusk showing the penetration of the whole lead piece.

knife struck a metal piece. The diameter of the metal piece was ½". Attempts were made to identify the metal after microincineration. The metal was found to be lead in the form of yellow, rather opaque crystals, soluble in dilute nitric acid blackened by ammonium sulphide. There was definite lesion of the tusk right round the lead piece and the lesion ran about 3" below 1" above the metal piece. Histological sections were taken at 15 micron thickness at different parts of the lesion to study the distribution of the metallic substance. The sections were treated with chromic acid. Microscopically the particles were identified as lead. The concentration of the lead particles seemed to be higher just around the lead piece and was considerably less at the borders of the lesion. Figure 2 shows higher concentration immediately next to the lead piece and Fig. 3 shows single collection of lead particles far below the location of the lead piece. X-ray pictures revealed that the size of the lead piece was about 1" in depth embedded in an irregular manner.

In this specimen, the unusual penetration of the foreign body into the middle of the tusk without any external injury and therefore without any visual evidence of retained foreign body is a feature not seem to have been recorded before in the literature, and at the moment an explanation for this observation is baffling.

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BEHAVIOUR OF CATALASE IN CORN (*ZEA MAYS*) AND SOYBEAN LEAF TISSUES

IT is reported that catalase from different animal tissues and bacterial cells did not have the same activation energy and behaved differently. The activation energy of horse erythrocyte catalase, of beaf liver catalase, and of bacterial catalase is not the same for all (Glick, 1954). In his studies on catalase-chlorophyll relationship in barley seedlings, Appleman (1952) found that catalase in etiolated seedlings had a lower activation energy than the catalase in green seedlings. In order to investigate how the catalase in monocotyledon and dicotyledon plants behaved an experiment was carried out.

Experimental material.—Corn (*Zea mays*) and soybean plants were raised in solution culture under controlled conditions of nutrient levels duration and intensity of light and temperature in a plant growth chamber. Three weeks after planting, replicated leaf samples were collected from both the sets of plants. Careful consideration was given for proper sampling of leaf tissue since the catalase activity has been found to vary markedly from the base to the tip of the leaf (Euler, 1948). The sampling was done in a cold room by clean hands and at no stage was there any contamination from metal.

Enzyme preparation.—One gram of aliquot portion of leaf sample was transferred to a clean chilled porcelain mortar containing 5 ml. tris buffer (0·2 *M* tris in 0·3 *M* sucrose solution,